

10. NAME(S) OF STRUCTURE

State Bridge Number 21A

11. PHOTOS (W/ FILM ROLL & FRAME NO.) AND SKETCH MAP OF LOCATION

17B:30-36

18B:0-18



17B:34A

Mack, Warren W. "A History of Motor Highways in Delaware", in Reed, Henry Clay, Delaware: A History of the First State, vol.2, pp.535-550 (NY: Lewis Historical Publishing Co., 1947).
Delaware State Program. Delaware State Highways; The Story of Roads in Delaware. [Wilmington, Delaware: 1919].
Downs, Winfield S. ed. Who's Who in Engineering. (New York: Lewis Historical Publishing Co., Inc., 1931).
Federal Writers' Project. Delaware: A Guide to the First State. (New York: Viking Press, 1938).
Hancock, Harold Bell. A History of Kent County, Delaware. (Dover, Del.: Dover Litho Printing Co., 1976).
Wilmington Morning News, 19 July 1965.
Spero, Paula A. C. Metal Truss Bridges in Virginia: Suffolk Construction District. (Charlottesville, VA: Virginia Highway & Trans. Research Council, 1981).

Delaware State Archives. Kent County Road Records 1875-1940.
Delaware State Archives. New Castle County Engineer Records.
Delaware DOT records: Annual Reports; contract files.
Plans on file at Delaware DOT: Contract # 104A & B, 1049, 1573 (electrical repairs).

13. INVENTORIED BY:

AFFILIATION

P.A.C. Spero & Company with Kidde Consultants for Delaware DOT

DATE

April-November 1988

HABS/HAER INVENTORY

See "HABS/HAER Inventory Guidelines" before filling out this card.

1. NAME(S) OF STRUCTURE

State Bridge Number 21A

2. LOCATION

Rehoboth Road over Mispillion River
Milford, Kent County, Delaware

3. DATE(S) OF CONSTRUCTION

1929

4. USE (ORIGINAL/CURRENT)

Vehicular

5. RATING

Basal

6. CONDITION

Good: Some rust in floor beams and their connections. Also some concrete deterioration in concrete abutment.

State Highway Bridge 21A (Milford Bridge) is a single leaf rolling lift bascule bridge with two plate girder approach spans. The moving leaf of the bascule span measures 56'-6", while the fixed span and the south approach span measure 26'-0". The bridge width includes a 24'-0" roadway with a 5'-7" walkway cantilevered off the west side. The walkway has an unadorned pipe railing. The rolling lift bascule type, like the patented Scherzer design, is characterized by an overhead counterweight, supported by segmental girders which roll along track girders when the moving span is lifted and lowered. The Milford Bridge consists of combination steel girder and steel truss construction. The steel girder which supports the deck is a plate girder on both the moving and stationary spans, while the lifting and counterweight trusses consist of riveted members. The substructure consists of concrete piers and abutments on timber piling. All machinery, including gears and motor, is mounted above the road. There is an operator's house with stuccoed walls and a hipped roof on the north end of the bridge. Ornamental light standards top each concrete endwall.

Delaware Department of Transportation records state that Bridge 21A was built in 1929 under State Highway Department contract 104 (Federal Aid Project # 50a). Similar in configuration to the patented Scherzer type, the Milford bridge was designed by Keller and Harrington, consulting engineers specializing in movable spans, and located in Chicago. Because the bridge crossed a navigable waterway, approval from the War Department was required prior to construction. C.D. Buck as the Chief Engineer of the State Highway Department applied for this approval on August 25, 1928; following a public hearing, approval was granted by the regional office of the Army Corps of Engineers. Original plans on file at the Department delineate structural and mechanical details and also the operator's house. Notes on the drawings specify "A pleasing elevation, architecturally will be one of the requirements". The bascule bridge was designed by Keller and Harrington, Consulting Engineers of Chicago, Illinois. Charles Lincoln Keller received his degree in engineering from Lehigh University in 1893. He was involved in the design of numerous movable bridges throughout his career. From 1916 to 1922 Keller was president and chief engineer of the Scherzer Rolling Lift Bridge Company, located at 1616 Monadnock Block, Chicago. He later joined H.P. Harrington to form the Chicago-based engineering firm, Keller and Harrington, which specialized in movable bridges. This firm was responsible for other movable bridges in Delaware, including State Bridge #159 in Newport. The operating machinery was fabricated by The Earle Gear & Machine Company of Philadelphia, and the structural members were fabricated by the Bethlehem Steel Company of Bethlehem, Pennsylvania. Local contractors were awarded separate contracts for the substructure and superstructure. The State Highway Department awarded the \$25,985 contract for the substructure to George Shockley of Rehoboth on February 1, 1929 and work began 27 days later. George and Lynch, a Dover firm, initially received the contract to complete the superstructure for \$32,957.50 on May 20, 1929; Delaware DOT records note due to lack of experience in building steel bridges, George and Lynch's contract was assigned on September 5, 1929 to Al. S. Fox of Dayton, Ohio, who was engaged at that time in the construction of the bascule bridge over the Christiana River at Newport (Bridge 159). The lapse in time caused by the contract assignment created confusion and delay among materials suppliers. Bridge 21A opened on August 1, 1930. The bridge was designed to AASHO Standard Specifications for Highway Bridges 1925, Live load :Class H15. Handwritten stress tables for bascule girders, truss members and floorbeams appear on the drawings. The total cost of the bridge amounted to \$60,026.18, part of which was covered by the Federal Aid Program (Project No. FAP 60B). The structure was refloored in 1952 under contract 1049, replacing timber flooring with open mesh steel.

One of seven extant highway bascule spans, State Bridge 21A is the only bascule bridge surveyed in Kent County. It is a rolling lift bascule, similar in configuration to the patented Scherzer type. In general, the patented bascule designs were either of a pivoting, or trunnion, variety or a rolling type. In the rolling-lift category the predominant types were the Scherzer and Rall patents. The rolling-lift bascule bridge continually changes its center of rotation and shifts its load application point as its center of gravity moves in a horizontal line. J. A. L. Waddell, a historian of movable bridges as well as an innovator of the type, described all bascule bridges as follows: "they represent, probably, the best and most profound thought that has ever been devoted to bridge engineering." State Bridge 21A was an important component of a project designed to relieve the congested streets of Milford's central business district by providing a bypass around the town. The new route also helped to serve the increasing traffic to beach resorts at Rehoboth. Such "cutoff" projects were among the types of major construction for which Delaware received federal aid during the 1920s and 1930s; they highlight the important role this assistance played in enabling the State Highway Department to accomplish its program of modernization and expansion of the state road network during this period.